CLAIMS

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1. An electricity supply system for traction, comprising a 3-phase high voltage distribution line, a transformer station connected to two of the three phases of the distribution line or to a symmetrizing device converting three phases to two phases (e.g. a Scott connection), and having a transformer comprising a winding, and a traction supply line fed by the transformer station, characterised in that said winding includes insulation consisting of at least two semiconducting layers, each layer providing a substantially equipotential surface, and solid insulation between said semiconducting layers.

2. An electricity supply system for traction, comprising a 3-phase high voltage distribution line, a rotating converter connected to the three phases of the distribution line and having a winding, and a traction supply line fed by the rotating converter, characterised in that said winding includes insulation consisting of at least two semiconducting layers, each layer providing a substantially equipotential surface, and solid insulation between said semiconducting layers.

3. A system as claimed in claim 2, wherein high voltage switchgear is connected between the distribution line and the rotating converter.

4. A system as claimed in claim 3, wherein a transformer is connected between the switchgear and the rotating converter.

5. A system as claimed in claims 2, 3 or 4, wherein the frequency of the supply at the traction supply line is 25 Hz or 16⅔ Hz.

6. An electricity supply system for traction, comprising a rotating converter adapted to be supplied by a 3-phase high voltage distribution line and having a winding,

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the rotating converter supplying a single phase traction supply line and, via a first transformer, a high voltage intermediate line which is connected to the traction supply line via one or more further transformers, characterised in that said winding includes insulation consisting of at least two semiconducting layers, each layer providing a substantially equipotential surface, and solid insulation between said semiconducting layers.

7. A system as claimed in claim 6, characterised in that the winding of said first transformer includes insulation consisting of at least two semiconducting layers, each layer providing a substantially equipotential surface, and solid insulation between said semiconducting layers.

8. A system as claimed in claim 6 or 7, characterised in that the winding of the or each further transformer includes insulation consisting of at least two semiconducting layers, each layer providing a substantially equipotential surface, and solid insulation between said semiconducting layers.

9. An electricity supply for traction, comprising a rotating converter having a winding and adapted to be supplied by a 3-phase high voltage distribution line, the rotating converter supplying both a single phase lower voltage traction supply line and a high voltage intermediate line which is connected to said traction supply line via one or more transformers, characterised in that said winding includes insulation consisting of at least two semiconducting layers, each layer providing a substantially equipotential surface, and solid insulation between said semiconducting layers.

10. An electricity supply system according to claim 9, characterised in that the or each transformer has a winding including insulation consisting of at least two semiconducting layers, each layer providing a substantially

subA11 equipotential surface, and solid insulation between said semiconducting layers.

11. An electricity supply system comprising a rotating converter having a winding and adapted to be supplied by a 3-phase high voltage distribution line, said rotating converter supplying a transformer which in turn supplies a traction supply line, characterised in that said winding includes insulation consisting of at least two semiconducting layers, each layer providing a substantially equipotential surface, and solid insulation between said semiconducting layers.

12. A system as claimed in claim any one of claims 2 to 11, wherein said rotating converter is synchronous.

13. A system as claimed in claim any one of claims 2 to 11, wherein said rotating converter is asynchronous.

14. A system as claimed in any one of claims 2 to 13, wherein said rotating converter comprises a single machine having both motor and generator functions.

15. A system as claimed in claim 14, wherein said rotating converter comprises a phase converter.

16. A system as claimed in claim 11, characterised in that the transformer has a winding including insulation consisting of at least two semiconducting layers, each layer providing a substantially equipotential surface, and solid insulation between said semiconducting layers.

17. An electricity supply system for traction, comprising at least one autotransformer having a winding and being connected between a traction supply line and a neutral line, characterised in that said winding includes insulation consisting of at least two semiconducting layers, each layer providing a substantially equipotential surface, and solid insulation between said semiconducting layers.

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18. An electricity supply system for traction, comprising at least one current booster transformer having a winding and being connected between a traction supply line and a return conductor, characterised in that said winding includes insulation consisting of at least two semiconducting layers, each layer providing a substantially equipotential surface, and solid insulation between said semiconducting layers.

19. An electricity supply system for traction, comprising a static frequency converter unit connected between two transformers each having a winding, characterised in that said windings include insulation consisting of at least two semiconducting layers, each layer providing a substantially equipotential surface, and solid insulation between said semiconducting layers.

20. A system as claimed in any preceding claim, characterised in that at least one of said layers has substantially the same coefficient of thermal expansion as the solid insulation.

21. A system as claimed in any preceding claim, characterised in that the flux paths in the core of a magnetic circuit in the or each transformer or rotating converter consists of laminated sheet plate and/or rough forged iron and/or cast iron and or powder-based iron.

22. A system as claimed in any preceding claim, characterised in that the innermost semiconducting layer (32) which surrounds at least one conductor (31) is at substantially the same potential as the conductor(s) (31).

23. A system as claimed in any preceding claim, characterised in that the outer semiconducting layer (34) is connected to a selected potential.

24. A system as claimed in claim 22, characterised in that the selected potential is earth potential.

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25. A system as claimed in any preceding claim, characterised in that a current-carrying conductor of the winding comprises a plurality of strands, only a few of the strands not being insulated from each other.

26. A system as claimed in any preceding claim, characterised in that said winding(s) and also permanently insulated connection conductors for high tension current between the system units are produced using a cable (6) with solid insulation for high voltage and comprising at least two semiconducting layers (32, 34), and also strands (36) which may be insulated or uninsulated.

27. A system as claimed in claim 26, characterised in that the high-voltage cables (6) have a conductor area of between 30 and 3000 mm^2 and have an outer cable diameter of between 10 and 250 mm.

28. A system as claimed in any preceding claim, characterised in that said winding can carry a rated voltage of 10 to 800 kV.

29. A system as claimed in claim 28, wherein said rated voltage is higher than 36 kV.

30. A system as claimed in claim 28, wherein said rated voltage is higher than 72.5 kV.